

Electrostatically focused and deflected cathode-ray display tube using a P2 screen, providing yellow-green to green fluorescence with long persistence.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
Cathode-ray display/electron-gun section.

12AVP2 Cathode-Ray Tube

The **12AVP2** is a 12 1/2-inch diameter, single-beam cathode-ray tube designed for precision display and high-frequency oscillographic applications. Developed by Allen B. Du Mont Laboratories, the tube features electrostatic focusing and electrostatic deflection. It incorporates a gray glass faceplate to optimize small-area contrast and utilizes post-deflection acceleration to achieve high deflection sensitivity under high overall accelerating voltages. To facilitate high-frequency operation, the deflector connections are routed directly through the neck of the tube rather than the base. Additionally, a specialized deflection structure is integrated to minimize spot defocusing during deflection.

Optical Characteristics and Phosphor Specifications

The "2" suffix in the 12AVP2 designation specifies the integration of Phosphor No. 2. This phosphor is characterized by its distinct spectral and persistence properties, making it suitable for specific visual and photographic applications.

Parameter	Specification
Phosphor Number	2
Fluorescence	Yellow-Green
Phosphorescence	Green
Persistence	Medium
Faceplate Light Transmission at Center	~66%

While the underlying 12AVP- tube family can be configured with other phosphors (such as Phosphor 7, 11, 14, 19, or 25), the 12AVP2 is specifically defined by this medium-persistence, green-emitting screen.

Mechanical Design and Physical Dimensions

The 12AVP2 is a physically substantial tube with precise mechanical alignment tolerances to ensure accurate trace positioning and minimal pattern distortion.

- **Overall Length:** $22 \frac{1}{2} \pm \frac{3}{8}$ inches (22.12 to 22.88 inches)
- **Greatest Diameter of Bulb:** $12 \frac{7}{16} \pm \frac{1}{16}$ inches (12.34 to 12.50 inches)
- **Minimum Useful Screen Diameter:** 11.0 inches
- **Bulb Contact:** J1-22 cap (located on the side of the bulb)
- **Deflection Contacts:** Four J1-25 contacts located on the neck
- **Base:** Medium Shell 12-Pin Diheptal Base (B12-37)

Alignment Tolerances

- **Base Alignment:** The D1D2 trace aligns with Pin No. 1 and the longitudinal tube axis within ± 10 degrees.
- **Deflection Direction:** A positive voltage applied to deflecting electrode D1 deflects the electron beam approximately toward Base Pin No. 1. A positive voltage applied to D3 deflects the beam approximately toward Base Pin No. 11.
- **Bulb Contact Alignment:** The J1-22 post-accelerator cap aligns with Pin Position No. 1 within ± 10 degrees and with the D1D2 trace within ± 10 degrees. The J1-22 cap is positioned on the same side of the envelope as Pin No. 1.
- **Trace Alignment:** The angle between the D3D4 and D1D2 deflection traces is maintained at 90 ± 1 degrees.

Electrical Connections and Pinout

The 12AVP2 utilizes a 12-pin diheptal base (designation B12-37) for its primary electrical connections, while the high-voltage post-accelerator and high-frequency deflection plates use dedicated external contacts.

Pin Number	Element Connection
1	Heater
2	Cathode
3	Grid No. 1
4	No Connection (N.C.)
5	Focusing Electrode
7	No Connection (N.C.)
8	No Connection (N.C.)
9	Accelerator
10	No Connection (N.C.)
11	No Connection (N.C.)
12	No Connection (N.C.)
14	Heater

Note: Pins 6 and 13 are omitted from the physical base structure. The post-accelerator connection is made via the J1-22 bulb contact, and the four deflecting electrodes (D1, D2, D3, D4) are connected via the J1-25 neck contacts.

Direct Interelectrode Capacitances

The maximum direct interelectrode capacitances of the 12AVP2 are specified to assist in circuit loading calculations, particularly for high-frequency deflection drive circuits:

Capacitance Parameter	Maximum Value
Cathode to all other electrodes	6.0 μF
Grid No. 1 to all other electrodes	7.0 μF
Deflection Plate <u>D1</u> to Deflection Plate <u>D2</u>	4.0 μF
Deflection Plate D3 to Deflection Plate D4	3.5 μF

Capacitance Parameter	Maximum Value
Deflection Plate <u>D1</u> to all other electrodes	12.0 μF
Deflection Plate <u>D2</u> to all other electrodes	12.0 μF
Deflection Plate D3 to all other electrodes	7.0 μF
Deflection Plate D4 to all other electrodes	7.0 μF

Absolute Maximum Ratings

The following absolute maximum ratings represent the limiting values security limits of the 12AVP2. Operating the tube beyond these limits may compromise its performance or cause permanent damage.

- **Heater Voltage:** 6.3 Volts
- **Heater Current (at 6.3 V):** 0.6 μ 10% Ampere
- **Post Accelerator Voltage:** 11,000 Max. Volts DC
- **Accelerator Voltage:** 6,700 Max. Volts DC
- **Ratio of Post Accelerator to Accelerator Voltage (Eb3/Eb2):** 2 Max.
- **Focusing Electrode Voltage:** 3,000 Max. Volts DC
- **Grid No. 1 Voltage:**
 - Negative Bias Value: 300 Max. Volts DC
 - Positive Bias Value: 0 Max. Volts DC
 - Positive Peak Value: 0 Max. Volts
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode (during warm-up $\leq$ 15 seconds): 410 Max. Volts
 - Heater negative with respect to cathode (after warm-up): 180 Max. Volts
 - Heater positive with respect to cathode: 180 Max. Volts
- **Peak Voltage between Accelerator and any Deflection Electrode:** 1,500 Max. Volts

Typical Operating Conditions

For optimum performance, the 12AVP2 is designed to operate at a specific ratio of post-accelerator voltage to accelerator voltage (Eb3/Eb2) of 1.6. Deviating from this ratio can lead to degradation in deflection uniformity and increased pattern distortion.

Operating Parameter	Typical Value
Post Accelerator Voltage (Eb3)	9,700 Volts
Accelerator Voltage (Eb2)	6,100 Volts
Focusing Electrode Voltage	1,510 to 2,225 Volts
Grid No. 1 Voltage (for visual extinction of spot)	-135 to -202 Volts

Operating Parameter	Typical Value
Deflection Factor (D1D2)	100 to 150 Volts DC/Inch
Deflection Factor (D3D4)	100 to 150 Volts DC/Inch
Modulation (at 2 μ A beam current)	18 Max. Volts DC
Focusing Electrode Current (any operating condition)	-15 to +10 μ A
Spot Position (focused and undeflected)	Within a 20-mm square

Note: During spot position testing, all free deflecting electrodes must be connected to the accelerator.

Performance and Circuit Design Guidelines

Resolution and Line Width

The resolution of the 12AVP2 is characterized by line width measurements taken at a beam current of 2 μ A on a 4-inch raster. The tube is focused for the best line width at the center (point Aa), and subsequent measurements are taken across the face without altering the focus or astigmatism settings. Reversing the scan direction yields the "B" series of measurements.

The maximum allowable line widths at specified points on the tube face are:

- **Aa, Ad, Ae, Ba:** 0.32 mm
- **Bb, Bc:** 0.60 mm
- **Ab, Ac, Bd, Be:** 0.75 mm

Pattern Distortion

When displaying a centered 7.5 x 7.5-inch raster pattern, the edges of the pattern are guaranteed to fall within the boundaries of a 7.625-inch square and outside of an inscribed 7.375-inch square, ensuring high geometric fidelity.

Maximum Circuit Resistances

To prevent electrode biasing errors due to leakage currents, maximum circuit resistances must be strictly observed:

- **Grid No. 1 Circuit Resistance:** 2.0 Max. Megohms
- **Deflecting-Electrode Circuit Resistance:** 5.0 Max. Megohms
- *Recommendation:* It is highly recommended that the resistances in all deflecting-electrode circuits be approximately equal to maintain balanced deflection characteristics.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1960 Du Mont

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1960 DU MONT

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	—	—
Focusing Method	Electrostatic text	—
Deflection Method	Electrostatic text	—
Phosphor	P2 text	—
Fluorescence	Yellow-green/green text	—
Persistence	Long text	—

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